

Faculty Day 2021

Welcoming address by Prof Vinny Naidoo, Dean: Faculty of Veterinary Science

A very warm welcome to staff, students and Faculty guests this morning for Faculty Day 2021. I would also like to take the opportunity to give a very special welcome to Prof Peter Sutovsky of the University of Missouri who will be delivering today's Arnold Theiler Memorial Lecture entitled "Male infertility and semen evaluation: Andrology in the age of precision medicine and agriculture." We are also privileged to have our VC and Principal, Prof Tawana Kupe addressing us today to mark this very special occasion, being the official celebration of the Faculty's centenary this past year, which we had to delay due to COVID restrictions. Thankfully now the world has started to move towards normality, with even the hardest locked-down countries being Australia and New Zealand, abandoning this zero-virus policy in support of science due to the success of the new vaccines that were rolled out to control the pandemic. In what also at times appeared to be a hopeless situation last year, we now have proof that even treatment is possible (without needing to resort to the use of ivermectin), with Merck's Oral Antiviral Molnupiravir being shown to reduce risk of hospitalization or death by approximately 50% in comparison to the placebo in patients with mild or moderate COVID-19 (in interim analysis of phase 3 Study).

The COVID-19 vaccine also gives us an opportunity to look back in history at this remarkable invention the process of vaccination has been. As most would know the process of vaccination goes back many years, with the first vaccine being administered against smallpox in 1796 by vaccinating people with cowpox (and even horsepox), a less serious disease. All from a discovery made by Edward Jenner following his observation that milkmaids did not get sick from smallpox, which he speculated resulted from the nodules they developed on their hands from being infected with the zoonotic cowpox virus. It may, however, surprise a few to know that the word vaccination was created by Jenner, from the Latin word for cow being vacca. This remarkable invention led to the eradication of smallpox, the only human disease known to be eradicated. Even the concept of herd immunity is a well-established veterinary principle, with numerous diseases being controlled through vaccination of a significant portion of herds, as seen with the eradication of Rinderpest also through vaccination. Rinderpest was the second only disease to be eradicated, albeit this time a veterinary disease with significant contributions by Arnold Theiler, which led to us being here today.

Despite the proof of the protection that vaccines have offered for over 200 years, the science of vaccines is still being questioned today through really odd fake news stories ranging from DNA alteration, to being tracked through the vaccine containing metallic particles. And let us not forget the most cited reason being the lack of proper R&D in its development. As a veterinary pharmacologist, I've been asked a few times by concerned persons, to justify how a vaccine could enter the market within a few months of a major pandemic being announced, when it takes ten years to bring out new drugs. Once again, we need to trust the science that is allowing our society to progress. Would it surprise you to know that the first concept of an mRNA vaccine was discovered in late 1987, when Robert Malone performed a landmark experiment. He mixed strands of messenger RNA with droplets of fat, to create a kind of molecular stew. Human cells bathed in this genetic gumbo, absorbed the mRNA, and began producing proteins from it.

It was also as far back as 1978, when scientists used fatty membrane structures called liposomes to transport mRNA into mice. As far back as 1991, Merck scientists evaluated the mRNA technology in mice with the aim of creating an influenza vaccine, and only abandoned the approach as "the cost and feasibility of manufacturing just gave us pause," However, as technology improved and materials became cheaper, in the late 2000s, we saw several big pharmaceutical companies enter

into the mRNA field. You may only have heard of them recently, but BioNTech has been around from 2008, and was followed by many more start-ups with significant US governmental based funding in the field in 2012. So to answer the question simply, the COVID-19 vaccine is not new technology, and is based on science that is nearly 40 years old.

How many people would think differently of these vaccines if they realised that the technology it is based on is far older than the simplest smart phone we all carry around, which, by the way, was IBM's so-called Simon Personal Communicator invented in 1994. Oddly we are less concerned with a device that can really be tracked and which has an even higher safety risk than a vaccine: Taken into perspective, in the USA cell phone use while driving is estimated to cause 1.6 million crashes each year and nearly 390,000 injuries mainly from texting while driving. In contrast only 2 to 5 people per million vaccinated in the United States had anaphylactic reactions while for the more severe thrombosis with thrombocytopenia syndrome reported for the AstraZenica vaccine, only 47 cases were reported with 14.8 million doses being administered.

So what was the point of bringing in a technology-based history lesson into my address? How better to understand the Faculty today in our centenary celebration, than by looking back to where it all started. As you all know, the Faculty was founded by our first Dean, Prof Arnold Theiler in 1920, after setting up the programme and obtaining the funding two years prior to the first students being admitted. Our training, however, had a very humble beginning with eight students being admitted and studying at the Onderstepoort Bacteriology Laboratory. More important than the Faculty starting was the start of the impressive Bacteriology Laboratory that was opened in 1908, which even at that time was already designed with the correct facilities to train students. And why did Theiler set up such a facility? The facility became one of the key veterinary vaccine developing facilities on the continent to control two key diseases: Smallpox and Rinderpest. From our humble beginnings, the Faculty has grown from sharing one building with the researchers of the Bacteriology Laboratory to getting its own campus: The veterinary campus now boasts a total area of academic buildings of 60,000m² on a property which is 65 hectares (the same size as the Hatfield Campus). In addition to housing the office of the departments listed above, the campus hosts an extensive range of different laboratories, clinical facilities and an on-site training farm and the top Veterinary Academic Hospital on the continent, and one that can compete with the best globally. After a humble beginning with only those eight veterinary students, the Faculty has now grown to host over 1500 students, with future vets on our campus in training representing nearly a quarter of those already in practice.

Of course, boasting these statistics is of no value, without considering the impact of the Faculty. And what better time than our centenary to consider the true impact of having a veterinary school in our country. To place our impact into perspective, let us consider what the country was before the veterinary profession entered the fray. The country was rife with disease, such as rinderpest; foot and mouth and Nagana. Rinderpest alone was killing thousands of animals, while horses easily succumbed to horse-sickness in a time when they were extremely important for transportation. And human health did not fare much better with malaria and small-pox also being prevalent. So how did the Faculty, staff and graduates make things better?

First and foremost, the impact of any academic institution is best measured by the impact of their alumni on society. In our 100 years, the Faculty graduated 5139 veterinarians (BVSc); 1170 veterinary nurses (DVN); 308 of Masters of Veterinary Medicine (MMedVet); 509 Master of Science (MSc); 66 Doctors of Veterinary Science Degrees (DVSc) and 208 Doctor of Philosophy (PhD) candidates. And there is no doubt that our graduates have proceeded to change not only South Africa, but also made significant impact in many other countries. From just a financial point, our

graduates in practice today contribute R9 billion to the economy through their direct actions, and ensure the survival of an animal agricultural industry worth over R200 billion, especially when the entire value chain is taken into consideration. It is through their past efforts, that the country was able to mount mass insecticide campaigns to eradicate malaria and nagana. It was their ideas that allowed the red line quarantine zone to be successful and allow for a country with unique wildlife to support wildlife tourism, while maintaining a disease free status that allows for farming. And it was not just disease mitigation. Can you imagine what wildlife conservation would be in South Africa, without the dedicated veterinarians managing the safe movement of wildlife in private and public parks? And let us not forget the most recent and important contribution our young graduates are making during their community service year in ensuring that much needed services are delivered to the community. All in all, the Faculty is tremendously proud of the achievements of our alumni, who have ensured that their core training was used to better our country.

Also, over this period Faculty staff and post-graduate students have also been involved with research with numerous ground-breaking projects being undertaken in the various fields in which staff have worked. Some of these include advanced studies on the musculature of the elephant trunk to enable growth in robotics; being part of the team that were first in Africa to sequence a parasite's genome being the Cowdria or Heartwater parasite; developing one of the world's more recognised clinical parasitosis systems, FAMACHA; the validation of a toxicity model that was key to protecting endangered vulture species and advanced studies on the Babesia parasite in small animals to further understand disease physiology in both animals and man. And this impact is not just historic, as our staff and students are currently involved in various research projects such as new vaccine development, new disease identification, development of new diagnostic tests and development of advanced models for the study of human disease. And these outputs are evident in the research statistics in this last year which, despite the restrictions imposed by COVID and lockdown, were the highest for the Faculty at a record high 113 publication units, which translates to 251 manuscripts in our 100 years. And concurrent to the increase in publications we have seen a significant increase in the grants received. The next step for the Faculty is to increase the number of post-graduate students we train.

When looking at the achievements made by the Faculty in our first 100 years, it is clear that the Faculty and our Alumni have had a tremendous positive impact on the country. Nonetheless, the country still faces numerous threats to animal farming. In just the recent past, the country has seen a resurgence in Foot and Mouth; Avian Influenza; Horse Sickness and African swine fever; while brucellosis and tuberculosis remains a concern. So, what can be done? Moving forward there are a number of initiatives that I would like to see come to fruition, such as:

- When undertaking a more critical evaluation of the research outputs of the Faculty, it becomes evident that a strength of the Faculty is still the various aspects of disease research being undertaken across our five Departments and research centres. While much has been done by the departments, I ask the question... Is this enough... Can we not achieve more... I think that it is time for the Faculty to bring all these research activities together by creating a new Centre. The said centre would then be the focus of all disease research at the Faculty, be the Faculty's main focus for fundraising and also focus efforts on further improving animal-based agriculture in the country and Africa with the end result being to allow farms in SA to develop for the international trade. To me it is concerning, that it was already 125 years since Theiler suggested a fencing system to control the transmission of diseases such as Rinderpest and Foot and Mouth along our border.... and here we are today still using this concept with red line and its buffer zone to control Foot and Mouth. Perhaps it is time to

come up with new control strategies that can benefit all South Africa farmers. Who knows, in time, considering the current collaborations already taking place with NAS and FHS, there may be potential for the centre to grow into a University Research Institute, for which I can think of no more a fitting name than the Theiler Centre for Veterinary Infectious Diseases.

- Also, of importance to consider is the area of farming we support. While the Faculty has played a major role in traditional farming systems from cattle to poultry, in the past we were able to migrate our impact by the support of wildlife, be it conservation centres or wildlife ranching. But there are other areas of farming that we need to have an impact on. As an example, the Faculty had not focused much on aquaculture or on bee health. While other institutions in the country may have a head-start on us, the Faculty will be moving ahead with new research activities and post-graduate programmes in these areas. As we progress in the field, I foresee that the Faculty will become a leader in diseases management in these farming systems. In the process we will optimise production while protecting our environment, by ensuring healthy water bodies and healthy plants.
- And let us not forget the 4IR: No doubt as we move forward with technological advances, the Faculty needs to change focus on how we teach, in our research activities and how we undertake our diagnostics. As a result, there will be a need for new ways of disease diagnostics which will include smart devices using the internet of things; smart ICUs; external sensor monitoring of herds; and telemetric medicine. As we learn more about these fields, they can be implemented in how the profession is able to practice and grow and develop. To many this may be scary, as many see a veterinarian as being directly in front of the animal, while others may fear loss in income from competition created by persons practicing in a more distant environment. As with the start of the Faculty by Theiler in 1920, these activities will drive how the profession thinks and not *vice versa*. Change is scary, and not always smooth, but I am of the opinion that as a profession we are up for the task.
- Lastly we have molecular medicine: As we advance the OVAH, new opportunities for advanced therapeutics will become possible. Most recently this was seen in the advanced surgery on the knee of a cat; equine tracheal surgery and advanced cardiac surgery. Opportunities with 3D printing; advanced prosthetics; regenerative medicine and cancer treatments are all areas in which the Faculty may be improved.

Onto the focus of the day. Today we are here to take part in an event that has become a major feature in the Faculty's calendar. Faculty day, as an event, was held on 5 September 1984, to showcase research undertaken at the Faculty. However, as we evolved so has the day, so that what was an opportunity for staff and students to present became too much for one day. As a result, a new format was adopted in that the day is now dedicated to the presentation of research undertaken by Faculty post-graduate students, and from 2020 also our final year veterinary students who undertake an honours research project, all in a competitive process. Hopefully, today allows them to gain confidence in presenting, as well as starting their future careers in research wherever they may choose to work.

Another feature that has become part of Faculty Day is the Theiler memorial lecture, which has been a feature of the day since its inception. However, the Theiler memorial lecture has a much longer history. The Theiler memorial lecture was first approved for presentation by the University council, back in 1962 with the aim of hosting a prominent scientist whose experience will contribute to the

knowledge of the veterinary profession in this country. The first lecture was undertaken in 1963 by Professor C. Rimington, F.R.S., Professor of Chemical Pathology, University College Hospital Medical School, London. His talk focused on photosensitization syndromes due to porphyrins in animals (And if of interest to anyone is published in the JSAVA). One comment in the presentation that I thought fitting for the centenary was made by Prof Remington: "It has been said that Theiler put South Africa on the scientific map of the world and the Institute which he founded and directed for many years, is indeed revered wherever Veterinary Science is taught and practiced." It is in keeping this tradition, that we start Faculty Day today.

With this let me end by wishing our young presenters all the best. To our audience, wherever you're sitting and staring at a screen in your pajamas, I hope that you have an enjoyable day as our innovative faculty research is showcased. Please stay with us, as later today we have a little event to commemorate the centenary. Thank you, and have a lovely Faculty Day.